

KNOWLEDGE AND ATTITUDE TOWARDS IMMUNIZATION AMONG NEWLY ADMITTED MBBS STUDENTS IN A MEDICAL COLLEGE OF EASTERN INDIA

Sumita Sharma¹, Lipilekha Patnaik² & Sumitra Pattnaik³

¹Research Scholar, Department of Community Medicine, IMS & SUM Hospital, Bhubaneswar, Odisha, India

^{2,3}Professor, Department of Community Medicine, IMS & SUM Hospital, Bhubaneswar, Odisha, India

ABSTRACT

Introduction: Physician knowledge and support of vaccines greatly influences patients' decisions to get vaccinated. MBBS student should have fair knowledge and positive attitude regarding immunization so that they can improve parents' understanding of vaccines.

Objective: To evaluate the knowledge and attitude towards immunization among newly admitted MBBS students of IMS & SUM Hospital.

Methods: A cross-sectional study was carried out among 106 students who were newly entered to MBBS course. Data of demographic profile, knowledge and attitude towards immunization were collected using a self-administered questionnaire. Knowledge was assessed by 24 questions, each correct answer bearing 1 point. There were 6 questions regarding the attitude towards immunization assessed by Yes/ No option. Chi-squared test and Independent samples T test were applied to know the difference of knowledge across gender of students between knowledge and attitude of participants. Data analysis was done using SPSS v20 software.

Results: Mean score obtained by students were 9.35 ± 3.50 . There was no significant difference ($p=0.22$) in knowledge scores of males and female students. Regarding the source of information for vaccines, 32.07 % students knew through health care workers followed by internet (19.81 %) and medical journals (17.92 %). Information from parents and peers was rare. The attitude towards immunization was found to be positive among about 70 % of participants.

Conclusions: The present study revealed fair knowledge and positive attitude towards vaccination among students newly entered to MBBS course. The identified knowledge gaps and association between vaccine knowledge and attitude imply recommendations to introduce comprehensive vaccination curriculum at undergraduate level of medical studies.

KEYWORDS: Vaccination, NIS, UIP, Vaccines

Article History

Received: 02 Jun 2021 | Revised: 26 Jun 2021 | Accepted: 30 Jun 2021

INTRODUCTION

Immunization makes the person immune against an infectious disease by administration of antigen in the form of vaccine.¹ After administering the vaccine, it helps to energize body's own immune system such that it safeguards an individual from an infectious diseases.² It is the remarkable tool, used for the purpose of control and prevention of life-

threatening infectious disease. It is estimated that it prevents 2 to 3 million deaths every year and additional 1.5 million deaths could be avoided with the refinement in global vaccination coverage.³ In year 2016, death among children under the age of 5 years was found to be 5.6 million out of which there were 1500 under-five deaths per day and 2.6 million deaths in the first month of life globally.⁴

In 1985, the Universal Immunization Program (UIP) was introduced in India with an aim to cover at least 85 % of all infants by 1990.⁵ Further, a national socio-demographic goal was set up in National Population Policy (NPP) 2000 to achieve universal immunization of children against all vaccine preventable diseases by 2010. India's population crossed 1 billion mark on 11th May 2000, and is projected to reach 1.53 billion by the year 2050.⁶

Vaccination accredited as the best public health intervention since 20th century. Despite the proven benefits of immunization, vaccine hesitancy as well as reluctance remain a major public health concerns.⁷ In December 2014, India's Ministry of Health and Family Welfare launched Mission Indradhanush with the aims to vaccinate at least 90 % of pregnant women against tetanus and ensure that all children are fully vaccinated against seven vaccine-preventable diseases before they reach an age of two years.⁸

Among the eastern states of India, our state is the poor performing state in the health index compounded by the National Institute of Transforming India.⁹ Though the state has achieved a substantial increase in the immunization coverage of under-5 children since the last decade, still a large chunk of children (21 %) remained partially or completely unimmunized.¹⁰ However, one of the barriers for incomplete immunization was indistinct communication between healthcare providers and public about all types of vaccination. Previous studies have shown that lack of knowledge in physicians about the efficacy as well as patient eligibility for vaccine can influence the patient decision about vaccination and their recommendation to their patients.¹¹ Hence complete knowledge of vaccinations is important for medical students from their early career of life as they come into contact with many parents during their clinical posting and they can serve public against many infectious diseases by increasing their awareness. Medical students are future health care providers and they can act as motivator for high acceptance of vaccination among public. Experience with vaccines before and during medical college may impact these future physicians' recommendations about immunizations to their patients.¹² With this background, the study was conducted to assess the knowledge and attitude towards immunization among newly admitted medical students in a medical college.

MATERIALS AND METHODS

This study was a descriptive cross-sectional study of 106 newly joined MBBS students of a medical college of eastern India. The study was conducted in August 2019 during period of foundation course in a medical college of Eastern India. The students were gathered in the hall for orientation program regarding immunization by department of community medicine. To prevent nonresponse and contamination, all students were assembled in the conference hall and made them sit with proper spacing and then the questionnaire was distributed. To ensure privacy of each participant, 10 persons from Community Medicine department observed the whole process. The knowledge and attitude regarding immunization were assessed by using a semi-structured questionnaire. Before starting the orientation program about immunization, the hard copies of questionnaires were distributed among all participants. Universal sampling method was used to conduct the study. All students present during the time of survey were included in the study. Total 106 students were participated. Informed written consent was obtained before administration of questionnaire. Their participation was entirely voluntary considering the fact that they did not receive any type of award or credit.

The questionnaire was prepared by the investigators. After preparing the questionnaire, it was sent to 3 experts (2 from department of Pediatrics and 1 from Community Medicine) for validation. Modification was done as per their suggestion. After that the questionnaire was pretested among 5 students of different batch.

Study Tool: The questionnaire were organised into 4 distinct parts which included Part 1: demographic profile (such as age, sex, religion, education of head of the family and occupation of the head of the family); Part 2: information sources regarding immunization knowledge acquired by all participants; Part 3: knowledge about vaccination (such as all vaccines under National Immunisation Schedule, indication of vaccines, newer vaccines, vaccine storage, pulse polio program etc) and Part 4: Attitudes towards immunization. The questionnaire required 10-15 minutes for completion. The knowledge section (part 3) included 24 open ended questions each bearing 1 mark. The correct answers were specified and fixed while preparing questionnaire. The responses which matched to the prefixed answers were given 1 mark. The knowledge of each question were assessed after evaluation of the response given by all participants using 3 codes: "correct", "incorrect" and "don't know". For the betterment of the study considering 50 % as pass mark ≥ 12 was taken as good knowledge and below 12 was contemplated as poor knowledge regarding immunization. The attitude section of questionnaire (part 4) aimed to determine the acceptance and preference of vaccines among students. It contained 6 questions that required 2 levels of answers "Yes" and "No". The students who answered 4 or more questions correctly were considered to have "Positive" attitude whereas the students those answered correctly less than 4 questions were regarded to have "Negative" attitudes.

Data Analysis: The data collected were tabulated and analysed statistically using SPSS software version 20. Mean knowledge score and frequency of individual response was estimated by descriptive analysis. Independent sample test was used to assess the mean knowledge of participants. Bivariate analysis was applied for measuring the strength of association between participant's age and total marks obtained by the participants. Chi-square (χ^2) test was used for analysis of association between knowledge and attitudes of immunization among the participants. Results with a p-value < 0.05 were considered statistically significant.

RESULTS

The study was conducted to assess the knowledge and attitude towards immunization among newly admitted medical students in a medical college.

Out of 106 students of 1st year MBBS who participated in this study, 47.2 % were male and 52.8 % were female. The mean age of participants was 18.99 ± 1.60 years. Approximately 96.2 % of the total students were Hindu. Parents of 64.2 % students were professionals (doctor, engineer etc) whereas in 30.2 % students, the head of the family were graduate and in few students. (Table 1)

The majority of respondents were reported, the source of information about vaccines from their school (32.07 %) followed by from internet (19.81 %) and newspaper and medical journals (17.92 %). There were 12.26 % students, who reported that they got information about vaccines from their parents. (Figure 1) Getting information regarding immunization from newspaper and journals was significantly higher among males than female participants ($P < 0.001$).

The mean knowledge score obtained by the participants was 9.35 ± 3.50 . The mean knowledge score of male and female participants were 9.38 ± 3.17 and 9.32 ± 3.80 respectively. There was no significant difference found between the knowledge score of male and female participants ($P = 0.932$).

The knowledge of BCG vaccine, hepatitis B vaccine, DPT vaccine, OPV vaccine and Tetanus toxoid were well known to maximum participants (>50 %). Most of the students (62.3 %) were correctly named the first vaccine developed. It was found that 66 % students didn't know the full form of NIS i.e. National Immunization Schedule, 86.8 % of the study participants didn't know about Hib vaccine, 75.5 % have not answered to the question regarding rotavirus vaccine, 78.3 % of students didn't know about injectable polio vaccine. Other vaccines like MR and JE vaccines were known to very few participants(<35 %). The common name of pertussis as whooping cough was answered by 42.5 % students. Only 9.4 % students knew about pulse polio program. (Table 2)

Regarding the knowledge of optional vaccines, the knowledge regarding chickenpox vaccine was observed in 89.6 % of the total participants, only 4.7 % knew about pneumococcal vaccine and 3.7% knew about meningococcal vaccine. HPV vaccine was known to 15.1 % students. (Figure 2)

When enquired about malaria and dengue vaccine trial, correct answers were given by 24.5 % and 15.1 % participants respectively.

The correct knowledge about vaccine storage temperature was found among 41.5 % students whereas incorrect answer given by 20.8 % of students and 37.7 % gave response as don't know the answer. 65.1 % knew the exact meaning of "getting shots" whereas 3.8 % gave the response incorrectly and 31.1 % didn't respond to that question.

Among attitude questions, if the answer was 'NO' in question 1 and 3 were taken as positive attitude. The results showed there was no significant correlation between student attitudes towards immunization and their performance on the knowledge assessment ($P=0.214$). We also found that student's reaction towards the adverse effect of vaccine was maximum i.e. 76.4 %. Out of the total participants 47.2 % responded that, they will tell about the contraindication of vaccines to patients if necessary. Nearly 98 % students agreed that vaccine is necessary for protection of individual. Those who were in the favour of vaccination, they also agreed to recommend it to others. (Table 3)

Table 1: Socio-Demographic Profile of Student (n=106)

Socio-Demographic Factors	Mean + SD/ Number (Percentage)
Age	18.99 \pm 1.60 (Mean \pm SD)
Sex	
Female	56 (52.8 %)
Male	50 (47.2 %)
Religion	
Hindu	102 (96.2 %)
Others	4 (3.7 %)
Family Type	
Nuclear	67 (63.20 %)
Joint	39(36.79 %)
Education of Head of the Family	
Profession	68(64.2 %)
Graduate	32(30.2 %)
Intermediate	6(5.7 %)
Occupation of Head of the Family	
Professional	70(66.0 %)
Technicians	36(34.0 %)

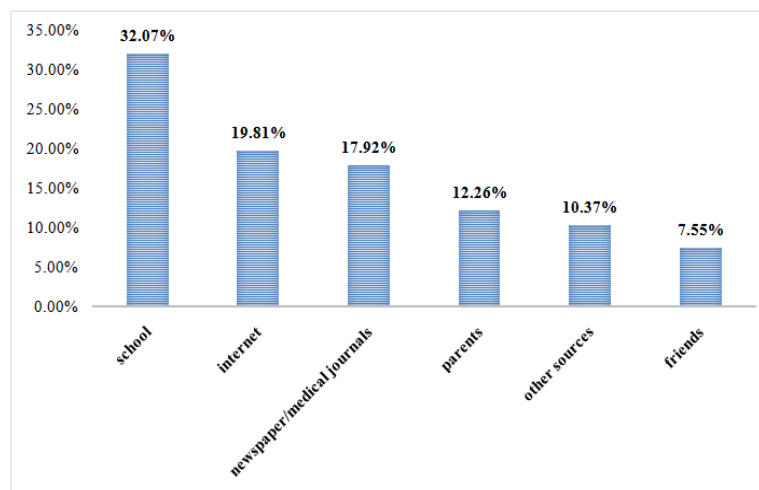


Figure 1: Sources of Information about Vaccination (n=106)

Table 2: Percentage of Correct, Incorrect Answers (n=106)

Items	Correct (%)	Incorrect (%)	Don't Know (%)
NIS full form	29(27.4 %)	7(6.6 %)	70(66.0 %)
BCG full form	60(56.6 %)	6(5.7 %)	40(37.7 %)
Hepatitis B vaccine	71(67.0 %)	19(17.9 %)	16(15.1 %)
DPT full form	71(67.0 %)	16(15.1 %)	19(17.9 %)
Hib Vaccine	2(1.9 %)	12(11.3 %)	92(86.8 %)
Rotavirus Vaccine	9(8.5 %)	17(16.0 %)	80(75.5 %)
OPV	58(54.7 %)	36(34.0 %)	12(11.3 %)
IPV	9(8.5 %)	14(13.2 %)	83(78.3 %)
MR Vaccine	16(15.1 %)	15(14.2 %)	75(70.8 %)
JE Vaccine	36(34.0 %)	12(11.3 %)	58(54.7 %)
TT Vaccine	58(54.7 %)	11(10.4 %)	37(34.9 %)
Pertussis	45(42.5 %)	8(7.5 %)	53(50.0 %)
1 st vaccine name	66(62.3 %)	22(20.8 %)	18(17.0 %)
Pulse polio program	10(9.4 %)	17(16.0 %)	79(74.5 %)
Age limit of pulse polio	47(44.3 %)	19(17.9 %)	40(37.7 %)
Indication of BCG	45(42.5 %)	5(4.7 %)	56(52.8 %)
Indication of DPT	71(67.0 %)	15(14.2 %)	20(18.9 %)

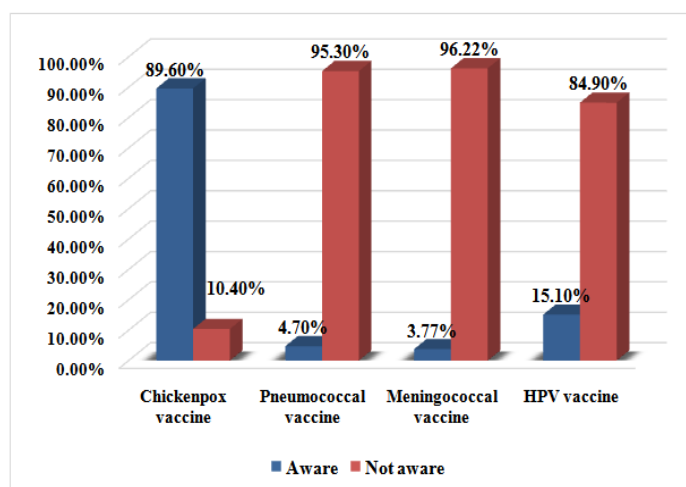


Figure 2: Knowledge about Newer Vaccines (n=106).

Table 3: Participant's Attitude towards Vaccination

Items	Yes (%)	No (%)	Not Responded (%)
Are you afraid of side effects of vaccine?	81(76.4 %)	20(18.9 %)	5(4.7 %)
Do you tell others about contraindication of vaccine?	50(47.2 %)	34(32.1 %)	22(20.8 %)
If the child receives extra immunization, is it more effective and safer?	13(12.3 %)	81(76.4 %)	12(11.3 %)
Vaccines are necessary?	104(98.1 %)	2(1.9 %)	0(0.0 %)
Are you in Favours of vaccination in general?	103(97.2 %)	1(0.9 %)	2(1.9 %)
Will you recommend vaccination to others?	102(96.2 %)	2(1.9 %)	2(1.9 %)

DISCUSSIONS

Assessment of knowledge and attitude towards immunization revealed several important findings. Medical students acquire knowledge of vaccination guidelines and experience with vaccines over the course of their complete MBBS educational years.

The present study revealed with very poor knowledge regarding immunization among all the participants i.e. mean knowledge score 9.35 ± 3.50 and more than 70 % students had shown positive attitude towards immunization. There were no such association between knowledge and attitude regarding immunization ($p=0.214$). Similar study conducted by Cvzetcovik et al. depicted with highly significant difference between the knowledge score and attitude ($t = 6.90, p < 0.01$) towards immunization.¹³ Another study by Ricco et al. also found that there was significantly ($P < 0.05$) increase in attitude with respect to their knowledge score.¹⁴ There were no significant difference found between the knowledge of male and female participants. ($P = 0.932$) The similar findings mentioned by the study which was carried out in Serbia¹³ with the knowledge score of male (Mean = 4.09, SD = 1.83) and female (Mean = 3.84, SD = 1.83) students which was also not significantly differ. ($P = 0.14$)

Most of the students got information about vaccination from their school (32.07 %) followed by internet (19.81 %) and then from newspapers and journals (17.92 %). But the study conducted by Jones et al¹⁵ showed, the most common information source of vaccination was healthcare provider (91.7 %), followed by vaccine information statements (printed materials from healthcare providers 84.0 %) and parents/friends (53.8 %). Similar results regarding vaccine information sources were obtained from past research conducted by Tomboloni et al, where they found around 41.6 % diploma holding healthcare workers got information about immunization through internet and from paediatricians.¹⁶

The above study revealed with maximum students i.e. 67.0 % had fair knowledge of both Hepatitis B vaccine and DPT vaccine followed by BCG vaccine (56.6 %), OPV and TT vaccine (54.7 %). Another study conducted by Ibrahim et al. showed that 89.06 % 1st year MBBS students had knowledge about Hepatitis B Vaccine.¹⁷ the knowledge regarding vaccine against pertussis and JE was found among 42.5 % and 34.0 % participants respectively. Previous study conducted by Sahoo B et al. in Odisha resulted out with 86 % ASHA workers had good knowledge regarding JE vaccine.¹⁸ Similarly the study carried out by Hdaye et al. among nursing students exhibited 69 % of participants were aware of JE vaccine.¹⁹ Correct answer about MR vaccine was given by 15.1 % students. Another study carried out by Chaitra KM and Yashoda HT showed the result that most of the nursing students i.e. around 58.3 % gave correct answer to the question of BCG and 15 % students gave right answer to MMR vaccine.²⁰ Likewise the study conducted by Ricco M et al, showed that, 80.5 % participants correctly answered about TT vaccine followed by polio vaccine (79.2 %), vaccine against rubella and diphtheria (76.0 % each), measles vaccine (75.3 %) and pertussis (74.7 %). 16.2 % participants correctly given the answer

regarding H influenzae type B.²¹ There was very poor knowledge found regarding Haemophilus influenza vaccine in this study i.e. only 1.9 % students have given correct answer to the Hib related question. The study conducted by Allela B, among pharmacy students depicted, 21.35 % students gave correct the answer regarding influenza vaccine.²² Another study conducted by Mereena M and Sujatha MR also shows similar type of result with poor knowledge (1.6 % participants) about influenza vaccine among the mothers.²³ On the contrary, it was found that nearly all DNP students (92.9 %) knew the necessity of influenza vaccine by the study conducted by Dybsand et al.²⁴

The knowledge of newer vaccines like HPV vaccines, pneumococcal vaccine, meningococcal vaccine vaccine, was found in few participants. Malaria and dengue vaccine trial was heard by very few participants. Similar study among nursing students in Spain depicted that only 25.3 % students have good knowledge about HPV vaccine though maximum participants (99.2 %) were aware of HPV vaccine.²⁵ Regarding Human papilloma virus vaccine (HPV), the study conducted by Cinar et al.²⁶ resulted that the knowledge score of female students was more as compare to male students ($P < 0.05$), whereas the present study didn't show any significant difference in between the knowledge of male and female participants regarding HPV vaccine. The study conducted by Sivasangeetha et al. among Arts and Science college students in Chennai showed 63 % of students correctly knew there is no commercially available malaria vaccine currently, despite many decades of intense research and development effort.²⁷ Authors from France had reported that 35 % travellers of African ethnicity believed that vaccines against Malaria are commercially available.²⁸ Similarly study on Resident's knowledge of influenza vaccine was very poor (ranged from 22.8 % to 72.2 %) and knowledge regarding pneumococcal vaccine was even less when compared to the influenza vaccine (ranged from 17.2 % to 57.2 %).²⁹ In the study conducted by Peter et al. depicted with the result of 30 % fresher students in the University of Italy were aware about Meningococcal vaccines.³⁰

In this study, 41.5 % were aware of vaccine storage facility. Around 38 % did not know about the storage temperature level. But the study conducted by Dairo et al, 70 % respondents were aware of a vaccine handling and storage guideline.³¹ In another study conducted by Norwati Daud showed 6.7 % participants knew correctly about temperature maintained in the refrigerator where vaccines were stored.³²

Regarding the attitude section, >70 % of students had positive attitude towards vaccination. They had agreed to recommend all types of vaccines in the future career. Other study showed the similar findings of positive attitude among 82.9 % participants towards safety of vaccines and 89 % participants showed positive attitude for recommending vaccine to common people.²⁴ There were many studies depicted with positive attitude towards immunization among healthcare providers and medical students.^{33, 34}

CONCLUSIONS

The present study revealed fair knowledge and positive attitude towards the vaccination among students newly entered to MBBS course. The identified knowledge gaps and association between vaccine knowledge and attitudes imply recommendations to introduce comprehensive specialized vaccination curriculum at undergraduate level of medical studies. Additionally, education regarding vaccination should include development of communication skills, since medical doctors are considered as the most important and most trusted source of information regarding vaccination for patients. Creating opportunities for all MBBS students to deliver vaccines through immunization clinics is needed for enhancement of their knowledge levels and confidence.

Limitation: The findings of this study cannot be generalized as the study was conducted in one Medical College.

REFERENCES

1. Shrestha R, Chhettri P, Bhusal CK, Ruchal R, Shrestha S, Shrestha B. Knowledge, Attitude and Practice Regarding Immunization among Medical Students. *J Univers Coll Med Sci*. 2019; 7(1):46–50.
2. How Vaccines Work | PublicHealth.org. Available from: <https://www.publichealth.org/public-awareness/understanding-vaccines/vaccines-work/>
3. WHO | Immunization. WHO. 2018; Available from: <http://www.who.int/topics/immunization/en/>
4. WHO/UNICEF. Global Immunization Data 2014. *WHO/Unicef Reports*. 2015;(October):2–5.
5. Lahariya C. A brief history of vaccines & vaccination in India. *Indian J Med Res*. 2014;139(4):491–511.
6. National Population Policy of India. Available from: <https://www.yourarticlelibrary.com/essay/national-population-policy-of-india/41254>
7. Kumar D, Noor N, Kashyap V. Vaccine hesitancy - Issues and possible solutions. *J Med Allied Sci*. 2018;8(2):55.
8. Mission Indradhanush | National Health Portal Of India. Available from: https://www.nhp.gov.in/mission-indradhanush1_pg
9. Niti Aayog. Healthy states progressive India Report on the Ranks of States and Union Territories HEALTH INDEX |. 2019. Available from: <http://social.niti.gov.in/>
10. National Family Health Survey (NFHS-4) 2015-16 INDIA. 2017. Available from: <http://www.rchiips.org/nfhs>
11. Anderson EL. Recommended solutions to the barriers to immunization in children and adults. *Mo Med*. 2014;111(4):344–8.
12. Riaz S, Arif M, Daud S. Immunization in medical students: Knowledge and practice. *Pakistan J Med Heal Sci*. 2017; 11(4):1501–4.
13. Cvjetkovic SJ, Jeremic VL, Tiosavljevic DV. Knowledge and attitudes toward vaccination: A survey of Serbian students. *J Infect Public Health*. 2017;10(5):649–56.
14. Riccò M, Vezzosi I, Gualerzi G, Signorelli C. Knowledge, attitudes and practices (KAP) towards vaccinations in the school settings: an explorative survey. *J Prev Med Hyg*. 2017;58(4):E266-E278.
15. Jones AM, Omer SB, Bednarczyk RA, Halsey NA, Moulton LH, Salmon DA. Parents' Source of Vaccine Information and Impact on Vaccine Attitudes, Beliefs, and Nonmedical Exemptions. *Adv Prev Med*. 2012; 2012:932741.
16. Tomboloni C, Tersigni C, De Martino M, Dini D, González-López JR, Festini F, et al. Knowledge, attitude and disinformation regarding vaccination and immunization practices among healthcare workers of a third-level paediatric hospital. *Ital J Pediatr*. 2019;45(1):104.
17. Ibrahim N, Idris A. Hepatitis B Awareness among Medical Students and Their Vaccination Status at Syrian Private University. 2014;Hepatitis Research and Treatment. 2014;2014:131920.

18. Sahoo B, Das SC, Konar A. Knowledge on Japanese Encephalitis Among ASHA Workers in A Coastal District of Odisha. *Nat J Comm Med*. 2019;10(5):299-303.
19. Hadaye RS, Shastri S, Lavangare SR. A cross-sectional study to assess the awareness and practices related to adult immunization among nursing students in a metropolitan city. *J Educ Health Promot*. 2018;7:129.
20. Chaitra K M, Yashoda H T. Knowledge of vaccination among the nursing students. *Journal of Evolution of Medical and Dental Sciences* 3(20):5637-41.
21. Riccò M, Cattani S, Casagrande F, Gualerzi G, Signorelli C. Knowledge, attitudes, beliefs and practices of occupational physicians towards vaccinations of health care workers: A cross sectional pilot study in North-Eastern Italy. *Int J Occup Med Environ Health*. 2017;30(5):775-90.
22. Allela OQB. Knowledge and Attitude of Immunization among IIUM Pharmacy Students. *J Basic Clin Pharma* 2017;8:S65-S69.
23. Mereena, Sujatha. A Study on Knowledge and Attitude Regarding Vaccines among Mothers of Under Five Children attending Pediatric OPD in a Selected Hospital at Mangalore. *IOSR Journal of Nursing and Health Science*. 2020;3(5):39-46.
24. Dybsand LL, Hall KJ, Carson PJ. Immunization attitudes, opinions, and knowledge of healthcare professional students at two Midwestern universities in the United States. *BMC Med Educ*. 2019;19(1):242.
25. Villanueva S, Mosteiro-Miguéns DG, Domínguez-Martís EM, López-Ares D, Novio S. Knowledge, Attitudes, and Intentions towards Human Papillomavirus Vaccination among Nursing Students in Spain. *Int J Environ Res Public Health*. 2019; 16(22):4507.
26. Cinar İO, Ozkan S, Aslan GK, Alatas E. Knowledge and Behavior of University Students toward Human Papillomavirus and Vaccination. *Asia-Pacific J Oncol Nurs*. 2019;6(3):300–7.
27. Sivasangeetha K, Sushi KM, Thatchinamoorthy G, Jacob SM. Health awareness on malaria and its recent developments in college students, Chennai, South india. *Int J Cur Res Rev*. 2015;7(17):15-9.
28. Pistone T, Guibert P, Gay F, Malvy D, Ezzedine K, Receveur MC, et al. Malaria risk perception, knowledge and prophylaxis practices among travellers of African ethnicity living in Paris and visiting their country of origin in sub-Saharan Africa. *Trans R Soc Trop Med Hyg*. 2007;101(10):990–5.
29. Amin H, Arafa M, Al-Omair B. Physicians' awareness and practice toward influenza and pneumococcal vaccines for high-risk patients. *J Fam Med Prim Care*. 2019;8(7):2294-99.
30. Moore PJA, Millar BC, Moore JE. Meningococcal ACWY vaccine uptake and awareness among student freshers enrolled at Northern Ireland universities. *Int J Adolesc Med Health*. 2020;32(1):1–11.
31. Dairo DM, Osizimete OE. Factors affecting vaccine handling and storage practices among immunization service providers in Ibadan, Oyo State, Nigeria. *Afr Health Sci*. 2016;16(2):576–83.
32. Azira B, Norhayati MN, Norwati D. Knowledge, Attitude and Adherence to Cold Chain among General Practitioners in Kelantan, Malaysia. *International Journal of Collaborative Research on Internal Medicine & Public Health*. 2013;5(2):157-67.

33. Cvjetkovic SJ, Jeremic VL, Tiosavljevic D V. Knowledge and attitudes toward vaccination: A survey of Serbian students. *J Infect Public Health*. 2017 ;10(5):649–56.
34. Deleanu D, Petricau C, Leru P, Chiorean I, Muntean A, Dumitrascu D, et al. Knowledge influences attitudes toward vaccination in Romania. *Exp Ther Med*. 2019;18(6):5088–94.